

sections including a section of L-arabinose-rich solution and a section of xylooligosaccharide or galactooligosaccharide and insoluble residue, and L-arabinose contained in the vegetable fiber is selectively extracted.

Marked Up Version Showing Changes

1. (Twice Amended) A process for the manufacture of L-arabinose, characterized in that, vegetable fiber is contacted with an acid, an acidic hydrolysis is carried out under such a condition that the concentration of acid is within the range [an extent] of 0.01N to [0.05N] 0.5N, and L-arabinose contained in the vegetable fiber is selectively produced.

4. (Twice Amended) The process for the manufacture of L-arabinose according to [any of Claims] Claim 1, characterized in carrying out the acidic hydrolysis under such condition that the solid concentration of the vegetable fiber is [an extent] within the range of 3% (w/w) to 20% (w/w).

5. (Twice Amended) The process for the manufacture of L-arabinose according to [any of Claims] Claim 1, characterized in carrying out the acidic hydrolysis under such condition that the temperature is 80°C to 150°C.

6. (Twice Amended) The process for the manufacture of L-arabinose according to [any of Claims] Claim 1, characterized in carrying out the acidic hydrolysis under such conditions that the total amount of the saccharides decomposed and eluted during the acidic hydrolysis is 30% or more on the basis of the dry substance to be hydrolyzed and that the [rate] proportion of L-arabinose in the total amount of the acid-hydrolyzed monosaccharides is 50% or more.

7. (Twice Amended) The process for the manufacture of L-arabinose according to [any of Claims] Claim 1, characterized in [dividing] separating the acid-hydrolyzed solution into [the] two sections [of including a section containing high amount] including a section of

L-arabinose-rich solution and a section of[,] xylooligosaccharide or galactooligosaccharide and insoluble residue.

8. (Twice Amended) A process for the manufacture of a sugar alcohol solution containing L-arabitol, characterized in comprising a [stop] step of hydrogenating the solution containing L-arabinose obtained in the manufacturing process according to [any of Claims] Claim 1.

Remarks

The Office Action objected to or rejected claims 1,4 and 7 for unclear wording. These claims have been amended as suggested. These amendments do not narrow the claims. Claim 1 has been amended to correct a typographical error and state the upper end of the range of acid concentration as 0.5N instead of 0.05N. This is supported in the specification at page 7, line 4.

The Office Action rejected claims 1-7 as anticipated by or obvious from the disclosure of U.S. Patent 4,816,078 to Schiweck, U.S. Patent 4,831,127 to Weibel (Weibel-1) and U.S. Patent 5,008,254 to Weibel (Weibel-2).

As described in page 4, line 18 to page 5, line 7 of the specification, in the conventional methods, an enzymatic method is advantageous with an object of specific liberation and production of L-arabinose in vegetable fiber as a monosaccharide of high purity, but such a method has the disadvantage that the yield is very low and is not practical in view of the productivity. On the other hand, when importance is paid to the yield, an acidic hydrolysis using a strong acid is advantageous but there is no specificity in the acidic hydrolysis. In addition to the necessary L-arabinose, unnecessary monosaccharides are also hydrolyzed, liberated and produced whereupon, as a result, there is a disadvantage that the purity of L-arabinose is extremely reduced, making the manufacture of L-arabinose difficult.

The present invention has been created for solving such disadvantages in the prior art. Its object is to provide a process for the manufacture of L-arabinose which is excellent in view of physiological function and is safe as a food from a by-product. The vegetable fiber containing L-arabinose as a part of the constituting saccharides is subjected to an acidic

hydrolysis under such a mild condition that L-arabinose is specifically obtained in high purity, good efficiency and high yield and that the secondary decomposition reaction hardly takes place.

The lower or milder concentration of the acid used in the present invention is very important for liberation and production of L-arabinose from the vegetable fiber in high purity and yield.

When the acid concentration is 0.50N or higher, not only L-arabinose, but also other saccharides such as D-xylose, D-galactose and D-glucose are liberated and produced together therewith. As a result, the specificity of the acidic hydrolytic characteristics to L-arabinose is lost. In addition, the L-arabinose which is once liberated and produced is decomposed, resulting in a lower content of L-arabinose. The acid concentration for an acidic hydrolysis of hemicellulose is usually 7% in case of sulfuric acid (corresponding to 1.5N) and, in the present invention, there is a characteristic feature in that a specific acidic hydrolysis is carried out at the acid concentration of as low as 1/150 to 1/3 or, preferably, 1/150 to 1/10 of these usual acid concentrations.

When the acid concentration is lower than 0.01N, the time required for the desired acidic hydrolysis is too long, and that is not commercially preferred.

Schiweck is similar to the above mentioned prior art and, therefore, involves several disadvantages. Schiweck does not disclose nor suggest hydrolysis under a mild condition (use of 0.01 to 0.5N acid solution) which is a characteristic feature of the present invention. Accordingly, Schiweck cannot attain the above object of the present invention. Also, Schiweck discloses only the processing of sugar beet pulp.

Weibel-1 discloses a strong acid or strong base, high temperature method as described at column 4, lines 54-60. At column 7, lines 9-12, Weibel-1 says to use acids with pH below 4.5.

Weibel-2 discloses the composition of beet pulp as being largely L-arabinose, D-galactose, and D-galacturonic acid (column 3, lines 21-25) with over 70% of the pectin being L-arabinose and D-galacturonic acid (column 5, lines 42-46). But, Weibel-2 does not disclose the specificity of the acidic hydrolytic characteristics to L-arabinose and the means therefore, which are characteristic features of the present invention. Please note that D-galactose and D-galacturonic acid described in Weibel-2 are unnecessary components to attain the object of

the present invention. Claims 7 and 11 specify the separation of a solution of galactooligosaccharide.

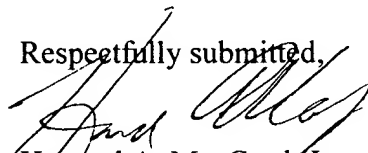
The Office Action cites Weibel-1 column 17, lines 48-57 for the proposition of using a 0.01 to 0.1N acid concentration. However, that passage is for operation at 165°C, well above the temperature range of claims 5 and 10.

In addition, Weibel-1 and Weibel-2 focus on beet pulp. Weibel-1 points out differences between sugar beets, apples and grapes at column 6, lines 5-8, and Weibel-2 points out that beet pulp pectin is very different from that isolated from other types of plant tissue, such as citrus pulp (column 3, lines 26-28). New claim 9 differentiates from the references by reciting operation on plant types other than sugar beets.

Thus, both Weibel-1 and Weibel-2 in combination with Schiweck do not teach nor suggest the present invention. The claimed invention is not taught or suggested by any of the cited references, nor does the Examiner provide the basis for the conclusion of obviousness, as required by *In re Lee* 61 U.S.P.Q. 2d (2002). The references or other evidence must provide a motivation to combine the references. A rejection for obviousness under *In re Lee* must reflect in the record a thorough and searching decision based on objective evidence which must also be outlined clearly on the record. Because the record is silent with the exception of the conclusion of obviousness, it is only with hindsight that one might speculate on the combination of references. Hindsight is an improper tool in obviousness evaluations.

This amendment has placed the case in condition for immediate allowance, and such action is respectfully requested. However, if any issue remains unresolved, Applicant's attorney would welcome the opportunity for a telephone interview to expedite allowance and issue.

Respectfully submitted,


Howard A. MacCord, Jr.
Registration No. 28,639

MacCord Mason PLLC
P. O. Box 2974
Greensboro, NC 27402
(336) 273-4422

Date: 22 July 2002
File No.: 4629-001

CERTIFICATE OF MAILING

I HEREBY CERTIFY THAT THIS DOCUMENT IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST-CLASS MAIL, IN AN ENVELOPE ADDRESSED TO ASSISTANT COMMISSIONER FOR PATENTS, WASHINGTON, D.C. 20231, ON July 22, 2002 (Date of Deposit)

Christian E. Carter

Name of Depositor



Signature

July 22, 2002

Date of Signature